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Surfactants

Sulphonation

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Surfactants Categories

Ballestra is the undisputed leader in process plants for surfactants, providing design, supply and technical assistance at site for process plants for the production of:

- ✓ **Anionics (Sulphonation/Sulphation, Vacuum Neutralization, Drying)**
- ✓ Non ionics (Ethoxylation/Propoxylation, Alkanolamides)
- ✓ Amphoterics and Cationics (Betaines, Esterquats, Aminoxides)

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Anionic surfactants

Feedstock and products

FEED		Surfactant
Linear Alkybenze (LAB)	Sulphur Trioxide (SO_3)	Linear Alkylbenzene Sulfonate (LAS)
Lauryl Alcohol	Sulphur Trioxide (SO_3)	Sodium Lauryl sulfate (SLS)
Lauryl Alcohol Ethoxylate	Sulphur Trioxide (SO_3)	Sodium Lauryl Ether Sulfate (SLES)
Linear Alpha Olefin	Sulphur Trioxide (SO_3)	Alpha Olefin Sulphonate (AOS)
Fatty Acid Methyl Ester	Sulphur Trioxide (SO_3)	Methyl Ester Sulfonate (MES)

With over 600 installations all over the world, Ballestra is leader in designing Sulphonation plant enhanced by the proprietary Multi Tube Falling Film Reactor.

Ballestra design handles single feed as well as multiple feedstock

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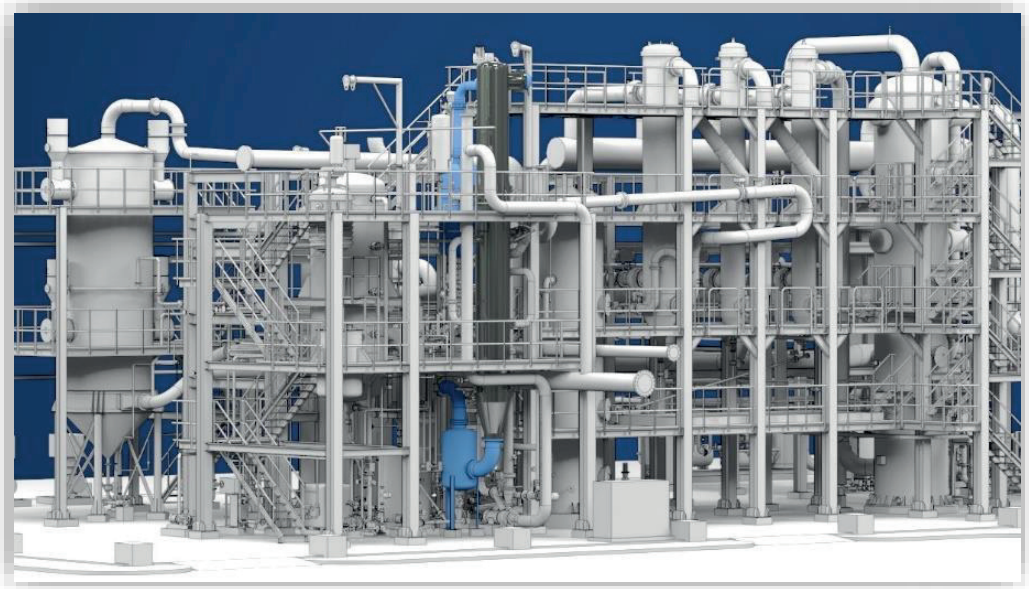
Anionic surfactants Production

Sulphonation Process (SULPHUREX)



Process for the production of anionic surfactants using the new generation of proprietary **Multitube Falling Film Reactor SULPHONEXT**

Other applications

MES Process

Process for the production of Anionic Surfactants starting from Methylesters adopting specifically designed ageing, re-esterification and bleaching units

WHITEX Process

Process for the de-aromatization of lube oil fractions by dedicated sulphonation process

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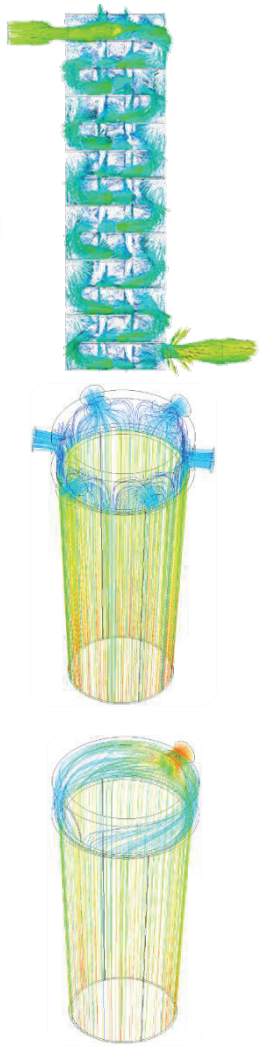
Anionic surfactants Production

Sulphonext reactor

- **Gas Collector**
  - ✓ Renewed by CFD
  - ✓ More uniform gas flow
  - ✓ Side reactions under control
- **Gas distribution system**
  - ✓ Higher process efficiency
  - ✓ Longer production run
- **Reactor head**
  - ✓ Calibrated flow distribution nozzles
  - ✓ Gentle and uniform liquid/vapor phase contact\

- **Reactor cooling**
  - ✓ Top part purposely designed
  - ✓ Patented baffles to increase turbulence



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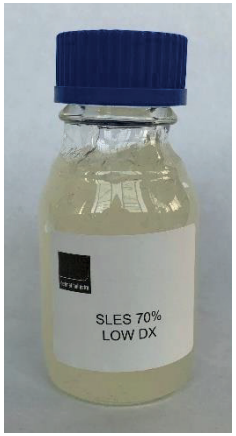
Anionic surfactants production



Vacuum Neutralization

Direct neutralization of ethoxysulphates under vacuum, with the contemporaneous stripping of Dioxane (carcinogenic by-product) adopting a proprietary Neutralization reactor/evaporator

Ultra Low / Hyper low Dioxane Ethoxysulphates production

Designed to produce SLES with **less than 5 ppm / down to 1 ppm** of Dioxane on 100% Active Matter basis (*), suitable to comply with the latest and most stringent environmental regulations (NY State bill S4389B).

The Desmet Ballestra process is characterized by:

- ✓ Contemporaneous neutralization, de-aeration & 1,4-dioxane stripping
- ✓ Dioxane removal up to 90% with no product degradation
- ✓ Lower energy consumption: -50% compared to conventional stripping systems

(*) 1EO – 2EO – 3EO SLES

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Anionic surfactants technologies

Active Matter Drying

Process for the production of pure anionic surfactants in solid form (powder, needles, granules) adopting a proprietary Wiped Film Evaporator

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Hyper Low Dioxane

Process Steps

1ST STEP: VACUUM NEUTRALIZATION

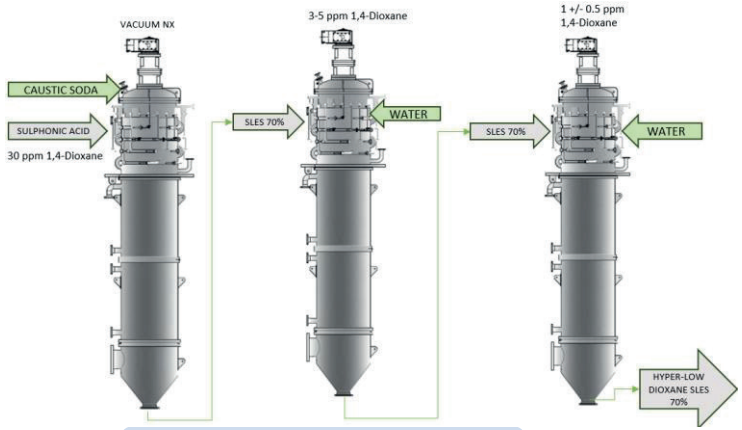
WATER EVAPORATION PROMOTED BY THE REACTION HEAT

2ND STEP: DIOXANE STRIPPING

WATER EVAPORATION DRIVEN BY HEATING

3RD STEP: DIOXANE STRIPPING

WATER EVAPORATION DRIVEN BY HEATING



SULPHATION REACTOR

VACUUM NEUTRALIZATION 2.0

PASTE IN-LINE DILUTION

VACUUM WFE STRIPPER

PASTE IN-LINE DILUTION

DIOXANE STRIPPING

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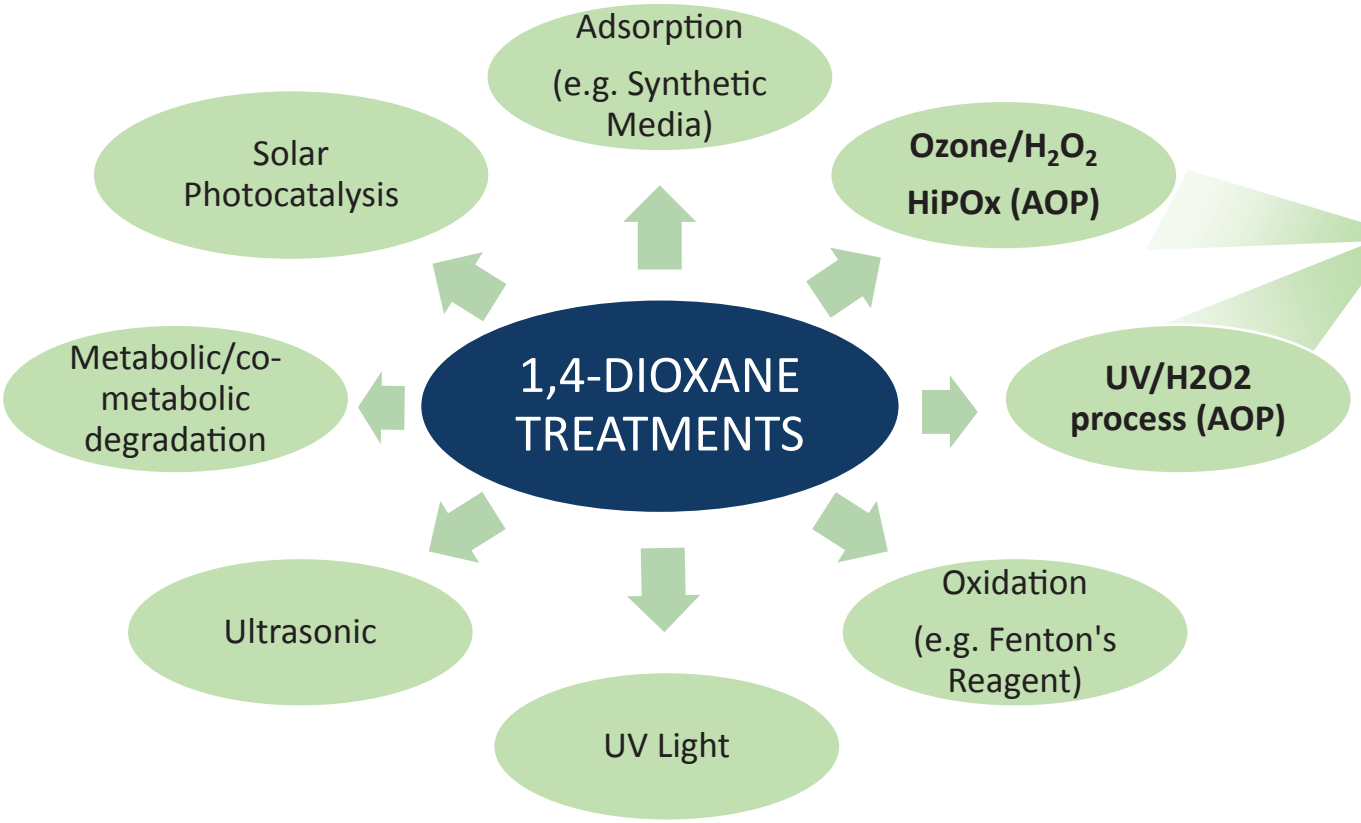
Dioxane Destruction



Advanced oxidation processes (AOP)

The technology commercially available can be used independently or as a pre- or post-treatment step in a remediation process.

AOPs use hydroxyl radicals, which are powerful oxidizers, to sequentially oxidize organic contaminants to carbon dioxide, water, and residual chloride.

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Project Profiles

A “taste” of what we do

No.4 parallel lines of Sulphonation for producing 24 t/h overall SLES (converting different MW of Ethoxylated Lauryl Alcohol derivatives).

Unit operating since 2018 in the USA, based on Ballestra proprietary technology.

No. 1 line of Sulphonation for producing around 2 tons/h of SLES / LABS.

Unit to be started up in Mexico by the end of 3Q 2024, based on the lastest Ballestra SULPHONEXT proprietary design

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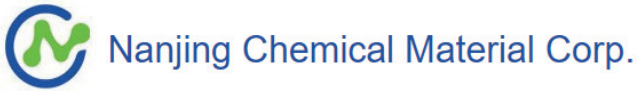
Our Customers



… and many others all over the world

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